Solar Mounts, LLC. Solar Carport Installation Manual

The Galactic Series

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Introduction

- The **Solar Mounts, LLC Solar Carport** is engineered for simplicity, durability, and performance. With the fewest components and hardware connections in its class, this solution streamlines installation while maintaining structural integrity. No drilling, cutting or welding is required. Bolt-to-design simplifies Post mounts to foundation cage and PV modules to purlins. All steel is pre-drilled, hot-dipped, G235 galvanized and 100% U.S.-sourced, meeting both AISC and BABAA certification standards.
- The system is highly configurable and adaptable to uneven terrain—ideal for sites where other structures can't be installed. PV modules deliver both shade and power, attaching easily with UL 467 & 2703 grounding washers and (proprietary) adaptable bracket for secure, grounded installations.
- Solar Mounts, LLC carport structures are engineered to withstand very high wind and snow loads. Waterproofing options include attractive under-decking or top-side water management components, with no impact on solar output.

Features and Benefits

- Four (4) main components and minimal hardware
- Pre-welded tilt angle (7°)
- Multiple clearance heights available
- Many Frame variations to match your goals and site (Y-, T-, L-, A-Frame, Long Spans)
- Universal brackets fit any PV module (‘panel”), industry-wide
- Solar Mounts LLC stocks components to maintain industry-leading lead times
- Solar Mounts provides stamped drawings in all 50 States and beyond

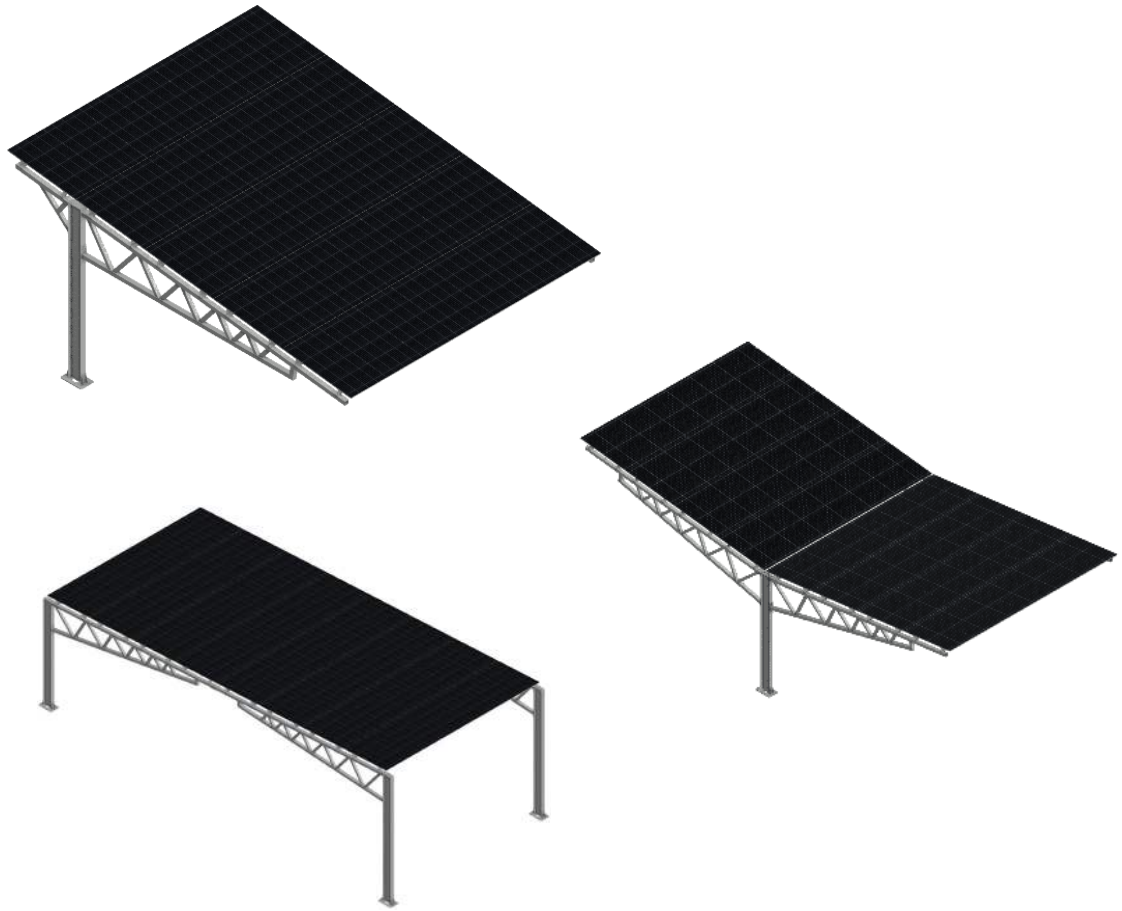
Safety Information

- General Safety Guidelines
  - Only trained personnel should perform installations.
  - Always follow OSHA guidelines for fall protection and workplace safety.
  - Wear appropriate PPE, including hard hats, safety glasses, gloves, steel-toed boots, and harnesses where applicable

- Equipment Safety
  - Inspect tools and equipment before use.
  - Use caution when operating heavy machinery like skid steers and post drivers.
  - Use licensed operators to ensure skilled operation of equipment

Hazard Warnings

- Be mindful of overhead power lines when lifting materials.
- Secure all materials properly to prevent tipping or falling.



Tools & Equipment Required

- Hand Tools
  - Impact Driver
  - Torque Wrench
  - Solar Mounts V-Clamp, or N Pliers
  - 15/16” Socket for 5/8” Bolt
  - 1/2” Socket for 5/16” Bolt
  - 3/4" Socket for 1/2" Bolt
  - 15/16” Combination Wrench
  - 3/4" Combination Wrench
  - 1/2" Combination Wrench

- Equipment
  - Excavator (with Auger bit if the site has pier footings)
  - Skid Steer
  - Scissor lift
  - Telehandler
  - Boom Lift
- Solar Carport System Ratings
  - PV Module Orientation : South
  - Grounding/Bonding Rating: UL 2703, UL 467
  - Mechanical Rating: UL 2703

Pre-Installation Guidance

- Working with Miss Dig (Public Locate)
  - Contractors must call (811) Miss Dig before they dig . This is typically a free service provided by the local utility company. More detailed surveys of underground utility lines, phone lines, fiber optics, water lines, etc. can be conducted using GPR devices.

811 Know what's below. Call before you dig.

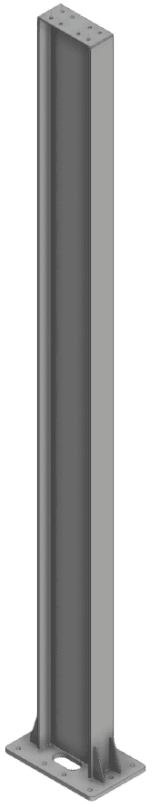
- GPR and LiDAR Data (Private Locate)
  - Underground detail can be gained by deploying ground penetrating radar (GPR) devices. GPR devices (e.g., US Radar, GSSI) can provide detailed information about shallow and deep obstructions, as well as accurate tracing of utility lines, water lines, fiber optics, telephone lines and more. GPR can provide up to 1 cm of accuracy although 5 cm is common with the addition of GPS (GNSS).
  - LiDAR devices are getting smaller and more accurate. These devices can be carried by drones and provide contractors with very accurate elevations and identification of above-ground contours, and give you detailed locating capabilities that can be transferred to construction drawings for the site.

Solar Carports Footings

- Solar Mounts,LLC and Solar-Construction offer three different types of foundations
  - Pier Footings - standard
  - Spread Footings – standard
  - Hybird, e.g., spread footings with Helical posts (per Geotechnical reportand structural engineering. Additional Costs do apply)

- Why Solar Mounts prefers Spread Footings
  - **Cost-Effective** – Uses less concrete / requires less excavation compared to pier footings. Savings are realized as there's less exposure to change-orders due to cave-ins, water, obstructions, etc..
  - **Faster Installation** – Easier to form & pour, reducing labor costs & project timelines.
  - **Better Load Distribution** – Spreads the weight over a larger surface area, minimizing settlement and improving stability.
  - **Ideal for Solar Carports** – Since solar carports distribute loads over a wide area, spread footings provide the necessary support without requiring deep drilling.
  - **Works Well in Most Soils** – As long as the soil is compacted and stable, spread footings provide excellent support with minimal ground disturbance.

Solar Carport: Main Components



Post

Purlin Stiffener

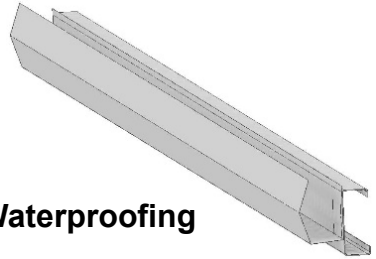
(SLR-CPT-PURLIN-STIFF)

27’-0” Purlin

Truss

(SLR-CPT-TRUSS-UP2-7)

Optional Mods

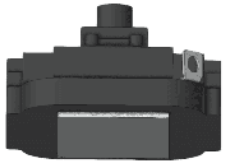


Waterproofing

Gutters and Downspouts

Snow Guards

LED Lighting



Pier Foundation Installation

- Saw Cutting and Excavating
  - Mark out pier foundation size and location according to SMLLC drawings and specs, along with the customer-provided licensed survey to confirm specific locations on the site plan
  - Cut out existing asphalt or concrete
  - Using a 36” auger, drill to a depth called out in Solar Mounts LLC stamped drawings and calculations (see SMLLC images below)
  - Fill bottom 3” with stone and compact
- Rebar and Concrete
  - Place Sonotube commercial concrete form and rebar cage into hole
  - Set bolt frame over concrete forming tube
  - Use Solar Mounts Anchor bolt template to hang anchor bolts down pier upright
  - Fill forming tube with concrete

- Pier Footing Images

Augured Hole

Placing Rebar Cages

Bolt Template Form

Complete

Spread Footings Installation

- Saw Cuttings and Excavating
  - Mark out foundation size and location according to SMLLC drawings and specs, along with the customer-provided licensed survey to confirm specific locations on the site plan
  - Cut out existing asphalt or concrete
  - Excavate to depth called out in SMLLC drawings (see images below)
  - Fill the bottom 3” (confirm on SMLLC drawings) with crushed stone and compact
- Rebar and Concrete
  - Tie rebar matts together with pier uprights in the center. See SMLLC drawings for appropriate rebar sizing and quantity
  - Drop rebar cage with uprights into hole
  - Use Solar Mounts Anchor bolt template to hang anchor bolts down pier upright
  - Fill forming tube with concrete

- Spread Footing Images

Tied Matts with Uprights

Set Cage

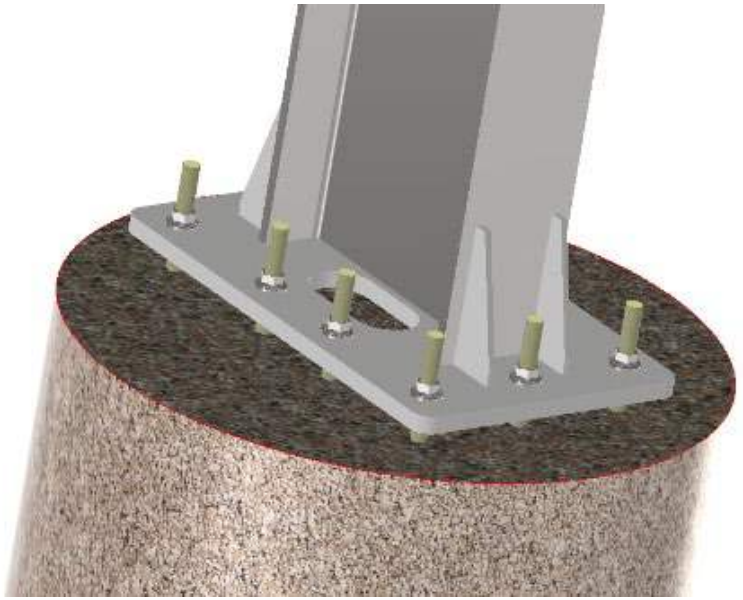
Forms

Pier Collar – Adjusting for Grade

- All standard SMLLC drawings include a 25” above grade pier
  - This may vary per customer requests, ensure to reference stamped SMLLC Drawings
- All projects include a 27” variance to account for grade change on same array
    - This can be found to reference on all SMLLC drawings
- **NOTE: going lower than pier height specified on SMLLC drawings will reduce the clearance height of the structure.**

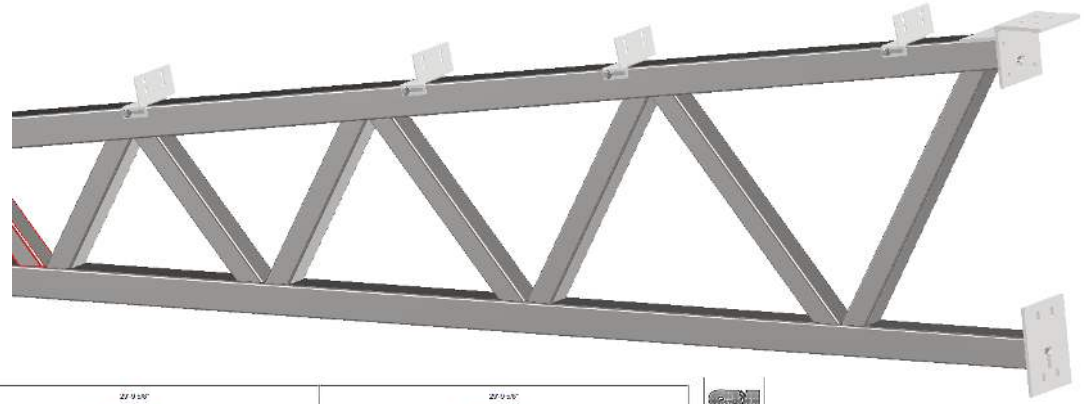
Placing Post on Foundation

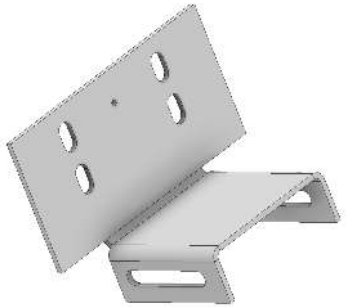
1. Sling and grab post from top using I-Beam clamps
2. Make sure placement is level on anchor bolts
3. Should be 1-1/2” Gap between top of collar and post base plate
   a) To be grouted at completion of job
   b) Referenced on SMLCC drawings
4. Conduit holes are located on both sides of base plate
5. Torque nuts to AISC snug tight + ¼ turn
   a) Mentioned on SMLCC drawings

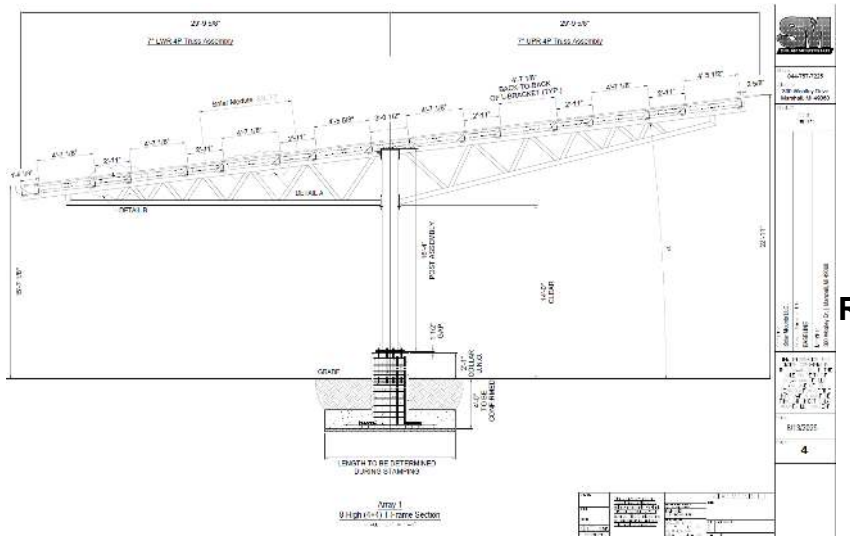


Bolting Adjustable L-Bracket to Truss

- On SMLLC drawing set, a side view is arranged showing the distances necessary to place all L-Brackets onto each truss
- On the ground, Bolt L-Brackets onto truss using 1/2” X 7” bolt
- Tightening to AISC snug (+ 1/4 turn)
- Also included:
  - ½” Flat Washer
  - ½” Lock Washer
  - ½” Nut



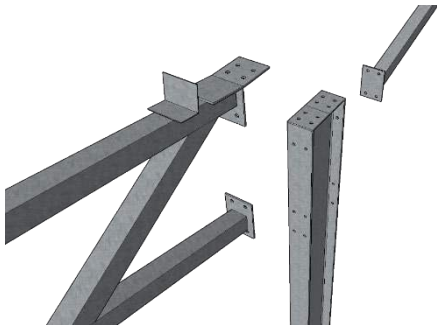


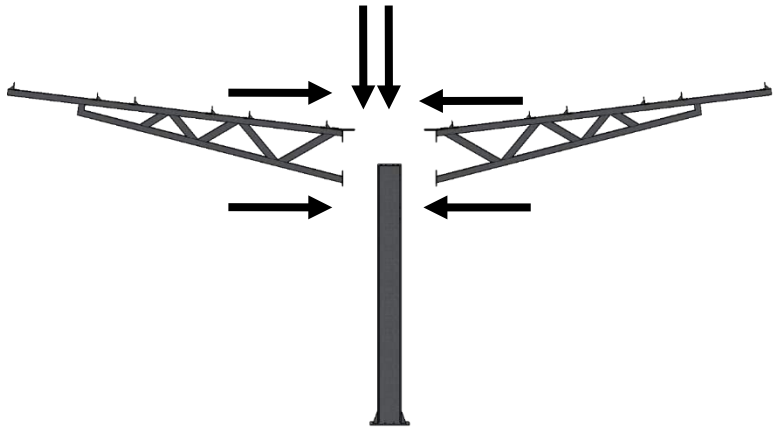


Reference these pages in your SMLCC Drawings

Attaching Truss to Post

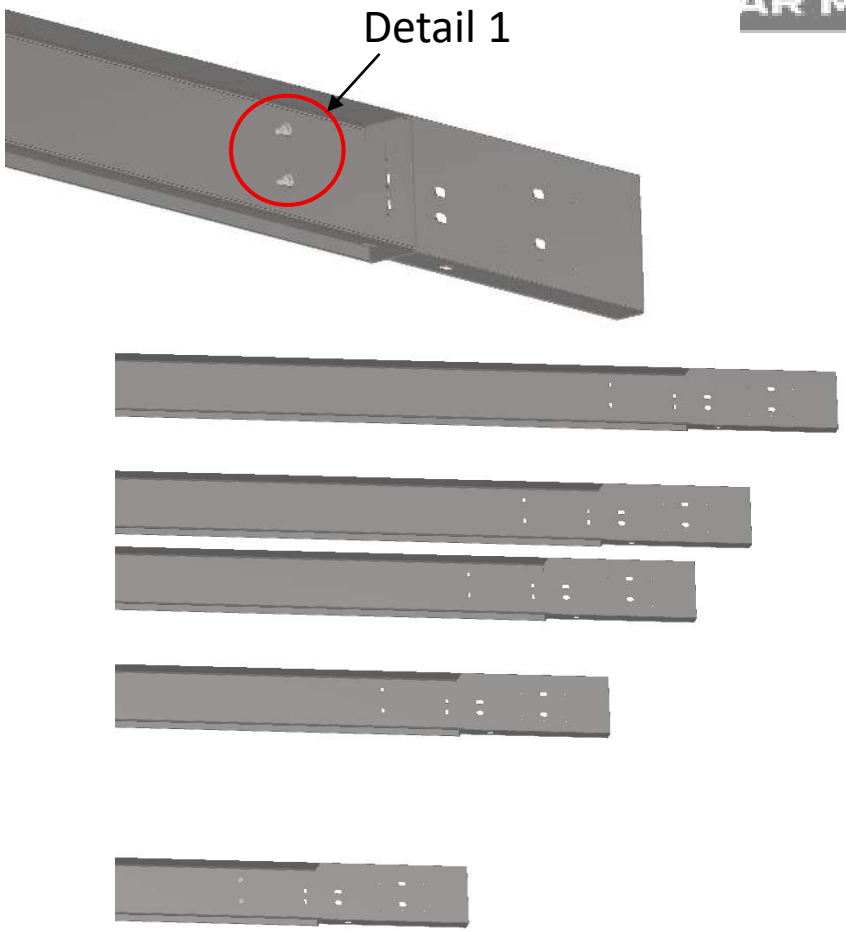
- Each truss will connect to the post using (12) ¾” x 2.50” Bolts
- Torque specs: AISC Snug Tight + ¼ Turn
- Also included:
  - ¾” Flat Washer
  - ¾” Lock Washer
  - ¾” Nut





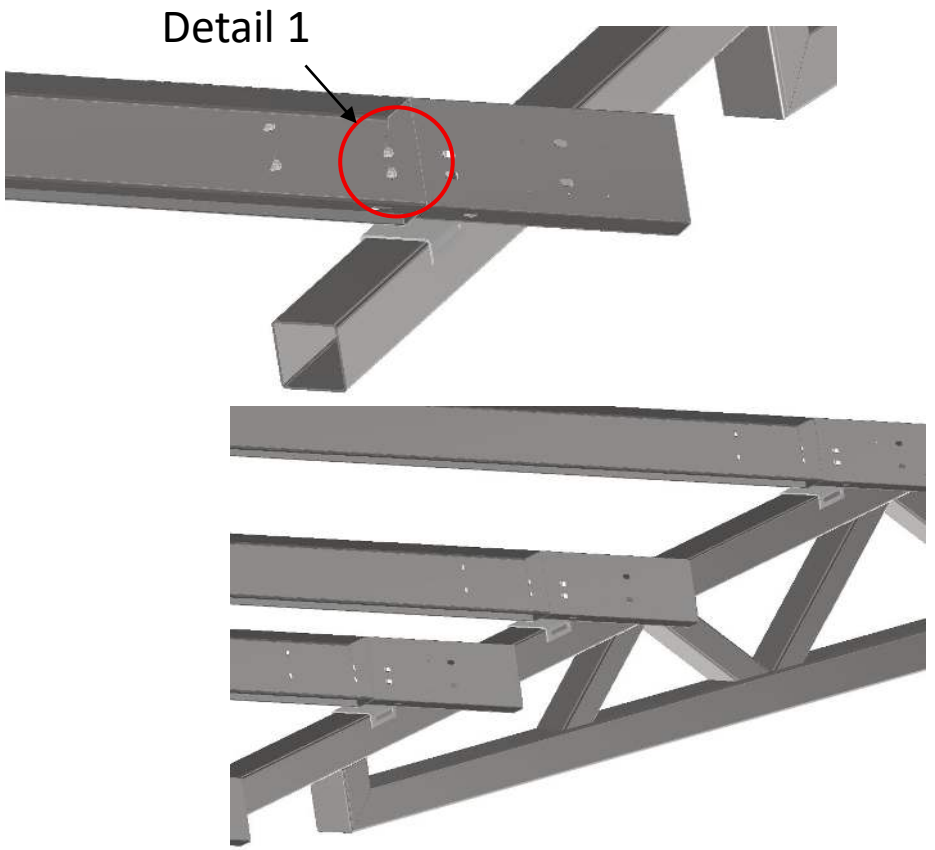
Attaching Overlap Plates and Purlins

- On the ground, Assemble 40” Overlaps to <u>one</u> end of the C-Purlins with (2) ½” x 1.25” Bolts (1/2” nut). Use the slots called out on Detail 1
- For <u>ONLY the first section</u> in each Array, put the overlaps on both sides of the purlins. Still only putting bolts shown on detail 1



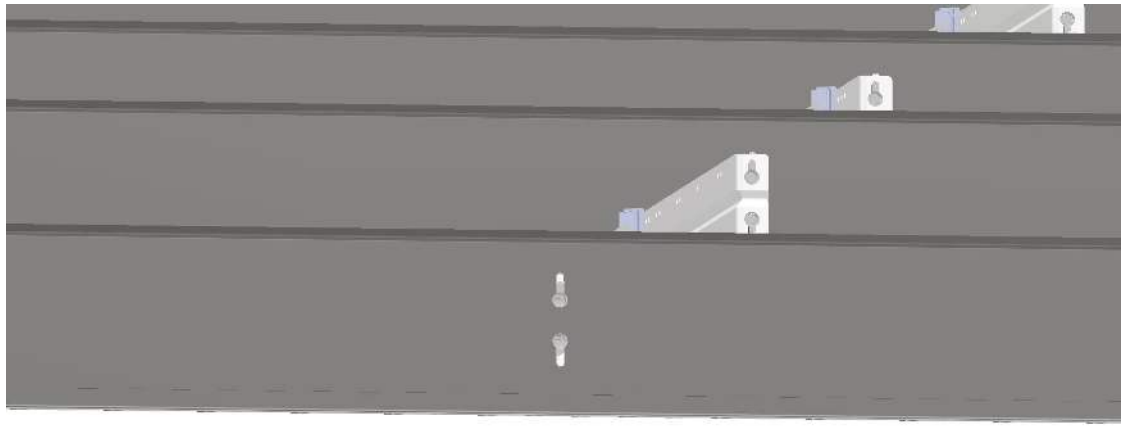
Attaching Overlap Plates and Purlins

- Lift purlin onto each L-Plate (which should already be fastened and measured in accordance with page 14), Overlap and Purlin together using (2) ½” x 1.25” Bolts (1/2” Nut) See Detail 1
- Upon completion, every purlin should have (4) ½“ fasteners on each end torqued to 70-80 ft-lbs



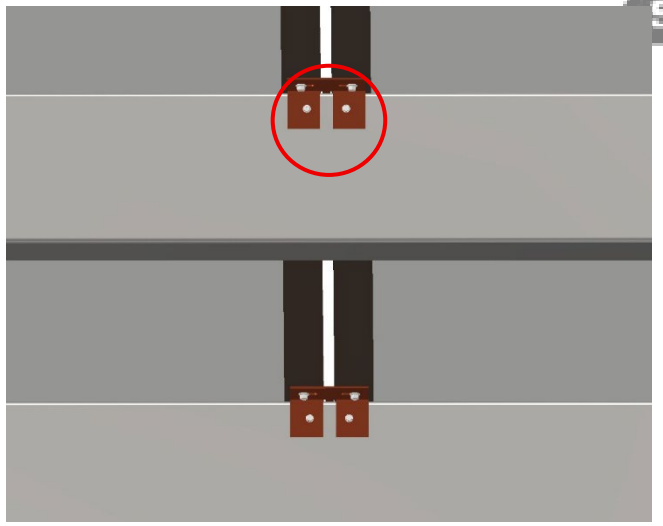
Purlin Stiffener Attachment

- See SMLLC drawings for appropriate spacing
- Compress the V-Clamp with SMLLC V-Clamp pliers (or needle nose pliers) and release into position (Detail 1)
- **NOTE:** many contractors fabricate a jig and build the Purlin stiffeners on the ground
- Attach the stiffener to purlins with (2) 5/16” serrated flanged bolt and nut (Detail 2)
- Torque 5/16” to 17-20 ft-lbs



PV Module Attachment & Installation

- Secure the bracket to the purlin using two (2) ¼" self-drilling screws into (Detail 1)
- Secure the PV module onto the PV bracket using ¼" x 0.75" bolt and ¼" nut, lock/spring washers and bonding washer (i.e. "WEEB"). The PV bracket will accommodate two PV module bolts/nuts/washer sets for the two adjacent PV modules. (Detail 2)
- Torque to 10-15 nm for M8, 90-120 in-lbs. for 5/16". **NOTE:** Avoid over torquing!

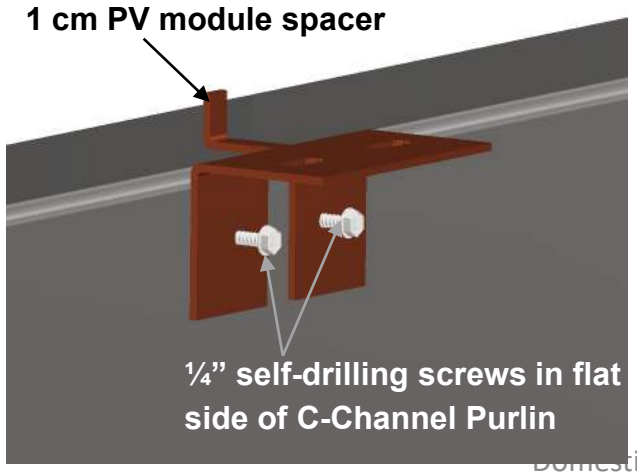


3

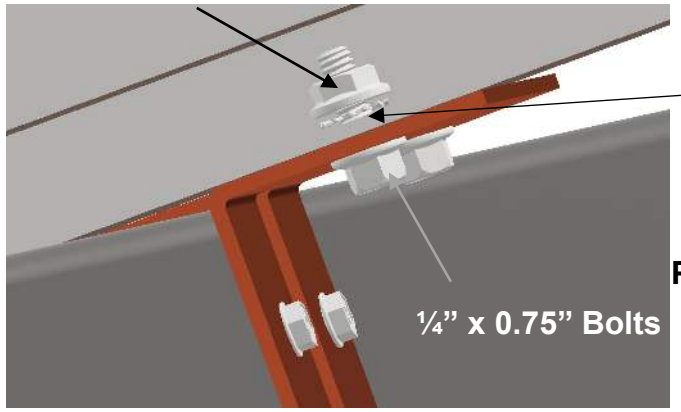
Two PV Brackets on two purlins. Each bracket supports two adjacent PV modules

1

PV Bracket in place on the C-Channel Purlin. Attached to the purlin with two (2) self-drilling screws. Note: 1 cm PV module spacer and two wide slots for the hardware for two adjacent PV modules



2



PV WEEBs (Washer, Electrical Equipment Bonding

PV Bracket mechanically fastening and grounding/bonding two adjacent PV modules to the bracket and Purlins

ELECTRICAL GROUNDING OF THE SOLAR CARPORT PV SUPPORT STRUCTURE

- Solar electric contractors must electrically ground the structure to a single premises ground. If more than one Ground Lug is attached to the structure, all these ground points and EGC's must be properly bonded together.
- Please see NEC Article 690.41, 690.47(C)(3), 250.52 and 250.53(A) for guidance.
  - Using a separate DC grounding electrode for the PV array and Solar Mounts LLC Solar Carport structure will enhance protection against lightning and transient voltage. For lightning protection associated with grounding systems, refer to NEC 250.106.
- Attach the Ground Lug (e.g., Ilsco GBL Grounding Lugs, Part #18-GBL-4DBT or equivalent) to the Solar Carport C-channel (e.g., commonly near the truss / I-Beam Post connection) using a #10 self-drilling screw (zinc or stainless steel, e.g., 1 ¼") so that the lug is flush with the truss surface. The Truss' I-beam is tough to self-drill into and may require a small pilot hole.
- If the Truss is powder coated (typically 60-80 microns thick, 2.5-3 mils), installation contractors may need to sand the powder coating away from the galvanized steel before connecting the ground lug to the truss). A stranded, insulated (recommended) grounding conductor is routed from the ground lug on the truss(es) to the premises ground rod.
- Tighten to 5 ft. lbs.
- CAUTION: PV module removal will not disrupt the bonding path. However, PV modules ("panels") should only be removed by qualified persons in compliance with the instructions in this manual

FINAL INSPECTION & MAINTENANCE

- Check all Carport Post, Strut and Purlin bolts and nuts for tightness. Any loose components or fastener shall be re-tightened in accordance with these instructions.
- Check PV array to ensure all PV modules are clean and unbroken.
- Check all PV module mid-clamps and end clamps are tightened to specification.
- Ensure all cement foundations are covered from weather and prepared for proper curing.
- Check optional modification components to ensure they are properly installed and functional. Ensure each canopy light is wired properly (and programmed per customers specifications) and that all components are physically secure (canopy lights, snow guards, gutters and downspouts)
- Periodically inspect the structure for signs of wear or loosening. If any components of the Solar Carport show signs of damage that compromises safety, these components shall be replaced immediately.

Contact Information & Warranty

- For questions or support, contact:
  Solar Mounts LLC
  Website:
  https://solarmounts.com
  Phone: (844) 757-7225

- **Warranty**
- To obtain the Solar Mounts LLC warranty, please fill out the SMLLC Commissioning Form for each project site and return to Solar Mounts, LLC.
- (NOTE: The SMLLC warranty starts at delivery of materials to customer site.)

List of Approved PV Modules (“Panels”) for UL 2703 listed Solar Mounts, LLC Solar Carport Structures*

- Solar Mounts, LLC. support structures are certified to UL 2703 for electrical grounding/bonding and mechanical requirements. Solar Mounts, LLC. system owners retain this certification when support structures are used only in combination with PV modules listed in the chart below.

- *Please contact Solar Mounts, LLC for the latest list of approved PV modules

Module Manufacturer	PV Module Model Number
Aptos	DNA-120-BF10-xxxW
Boviet Solar	BVM6612M-XXXS-H-HC-BF-DG
Canadian Solar	CS6W-xxxMS
Canadian Solar	CS7N-XXXTB-AG
Canadian Solar	CS6W-xxxMB-AG
Canadian Solar	CS6.1-54TM-xxxH
HT Solar (HT-SAAE)	HT72-18X (ND)-F
Imperial Star	ISM7-SHSB156-xxxM
JA Solar	JAM72D40-xxx/LB
JA Solar	JAM72D42-xxx/LB
JA Solar	JAM72D30-xxx/MB
Jinko	JKMXXXM-72HL4-TV
Jinko	JKMXXXN-72HL4-BDX
Jinko	JKMXXXN-72HL4-BDV
Jinko	JKMXXXN-78HL4-BDV
Longi	LR7-72HGD-XXXM
Longi	LR8-66HYD-XXXM
Longi	LR7-72HYD-XXXM
Maxeon	SPR-P6-XXX-UPP
Mission Solar Energy	MSN10xxxHN4G
Mission Solar Energy	MSN10xxxHT4T
Panasonic	EVPVxxxHK2
Peimer USA	DR10HxxxMB
Peimer USA	SFxxxM
Philadelphia Solar	PS-MNB108(HCBF)-xxxW
Phono Solar	PSxxxM8GF-24/TNH
Phono Solar	PSxxxM8GFH-24/TNH
Q Cells	Q.PEAK DUO ML-G12S
Q Cells	Q.PEAK DUO XL-G11S
REC	RECXXXAA PRO M
REC	RECxxxAA Pure
REC	RECXXXAA PURE-RX
SEG	SEG-xxx-BTC-BG
SEG	SEG-xxx-BTC-BG
SEG	SEG-495-BTD-BG
Silfab	SIL-620/630/640 XL
Silfab	SIL-520 QM
Silfab	SIL-420/430 QD
Trina	TSM-DEG19RC.20
Trina	TSM-NEG21C.20
Trina	TSM-DEG21C.20
Trina	TSM-NE09RC.05
Trina	TSM-NEG19RC.2
Waree	BiN-08-xxx
Waree	Bi-62-xxx
Waree	Bi-55-xxx